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THE GRADING OF SALMON

By DR. C. McLEAN FRASER

Paper read before the annual meeting of the Pacific Fisheries Society, held in Seattle, Wash., July 31, Aug. 1 and 2, 1917. Dr. Fraser takes the view that the present method of grading Canned Salmon by species is not a true guide to quality, owing to great variations in the same species according to time and place, and suggests that a better system of grading might be based on quality rather than species.



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By Dr. C. McLean Fraser.

In the Pacific Canned Salmon trade the basis for grading is and has been the species, although local terms in some cases may indicate the difference in a species in different localities. If this grading were strictly adhered to, in some cases there would be a decided injustice to the canner as well as to others. When in apparently conforming to a system of classification, a canner finds it necessary to make himself liable to penalty for infringement of the pure food laws, in order to properly conserve his own interests, it is time some change was made in the system.

Of the five species of the genus Oncorhynchus or Pacific salmon, O. tschawytscha is variously named the Spring, King, Quinnat, Chinook, and Columbia River, with King, Spring and Chinook as the common trade names: O. nerka is called the Red salmon, Sockeye, Blueback and Quiniault, with all of these names applied in the trade: O. kisutch is called Coho, Silver and Silver Sides, and in some localities before maturity, the Blueback, with Coho and medium Red as trade names: O. gorbuscha is the Humpback, with Pink salmon as the trade name and O. keta, the Dog salmon or Keta, with Chum or Keta as the trade name, although the term Pink salmon is applied to it in Siberia.

A difference in the quality of the same species in different localities is indicated, in some cases, by the prevailing prices. For instance the Columbia river Chinook always commands a higher price than the Alaska King and the Fraser river Sockeye than the Alaska Red, but there are other differences of which the prevailing prices give no indication.

It must be remembered that 95 per cent or more of the consumers of Canned Salmon are not able to distinguish the different species from one another and hence they must buy the salmon by the name on the label or by the special brand, consequently when a choice or prejudice is once established on a basis, real or imaginery, it is no easy matter to bring about a change. This is most noticeable in the color prejudice. With the majority of consumers, salmon cannot possibly be good unless it is red and they are willing to pay the difference in price for the color alone, since it does not necessarily signify that the red color is associated with good quality. The minority can keep down the high cost of living by paying half the price for the white salmon, getting, in many instances, the better flavored article. This is particularly true when the white flesh and the red flesh is found in the same species in the same locality at the same time, but it is also often true for different species. On the other hand it is doubtless true, when the fish of the different species are in their prime, very few people, if any, no matter how great their exri ence, are able to give an infallible judgment a to the species from the taste of the flesh alone.

The texture, the firmness, the amount of il the flavor, present in the flesh of any spe es varies much with the time the individual is ca h and while a difference in quality in fish i m different areas is recognized in the price of he canned product, this difference in the same l al ity is not to any extent recognized.

The Alaska King salmon is sold for but o thirds of what is obtained for the Columbia i er Chinook and yet there may be more differenc in the fish of this species caught in a certain ea in the one season than between typical fish i m these distant localities. Some Spring salmon ap parently spend the whole of their sea life in he waters of the strait of Georgia and in consequ ce fish of all ages may be caught and brought to the cannery on the same day. It is not c er that sea run fish in the first year, or stream un fish in the first or second year are caugh or brought in as they are too small, but everyt ng above these ages to those maturing in their th year, may appear. The flesh of a three-yea ld or even a two-year-old, when fresh, may be ite palatable, if prepared for eating soon afte i comes out of the water, but it lacks the firm ss of the older fish and the meat does not stan up so well in the can. If the fish is much han ed or if it is not used soon after it comes out of he water, the flesh falls away from the bones nd very shortly decay sets in. There is not so n c oil present and the color fades out in the c ok ing. Is it reasonable to suppose that the s me price should be paid for such salmon as for rs class mature Spring? Other things being equ i is safe to say, that a salmon of any species a its best immediately before the beginning of he rapid development of the milt or roe in prep ra tion for spawning. At that time there is a sur u of nourishment stored up in the body to be dr wn upon for the production of the highly organ ed elements of these sexual products. As dev op ment proceeds the store gradually becomes de pleted, until, when spawning time is reac ed there remains only sufficient to supply the en gy necessary for the spawning act, after which, nd in some instances during which, the fish uc cumbs. Many of the Spring salmon go so ar up the large rivers that the surplus of nou sh ment is still large when they enter the f sh water, but in other cases deterioration is pla ly evident. Yet all these go in with the seas n catch of Spring salmon.

With the Sockeye much the same thing h ds true except that since the fish of this specie do not feed in the inner waters, immature fish re

not caught with the others. There is the same graduation from the prime condition of the well-nourished fish to the wreck that reaches the spawning grounds, unfit for human consumption.

Medium Reds are quoted at much the same price all along the coast and if the mature Coho differs materially in quality in different areas, little attention has been paid to the difference. When the salmon rivers empty almost directly into the open sea, none but the mature Coho enters into commercial consideration, but in inner waters, such as the Strait of Georgia, this species is caught in earlier stages as well and these stages provide greater variety, as it affects the canning industry, than is found in any other species. In the early spring, as early as February at times, but more extensively in March and April, the Coho, then in its third year, becomes very evident in these waters, as the food supply, crustaceans, mostly shrimp-like schizopods, is plentiful at or near the surface. These "Bluebacks," as they are locally called, even when gorged with these crustaceans, take the spoon readily, and many of them can be caught thus in a single day. It is a great waste to catch them at this time as Bluebacks that weigh 1½ to 2½ pounds in March will weigh 5 to 8 pounds in July. While they are so small and while they are feeding so voraciously they must be used soon after they leave the water as the flesh is soft and soon starts to decay. This is particularly true if the fish are left in the round for the crustaceans in the stomach go bad very rapidly and this rots the flesh of the fish: the bellies burn out. On that account the canned product from these fish is not always desirable as a very slight delay in getting them into the cans may make so much difference in the quality. Even at the best the flesh is too soft to make the best canned product. It is true that the majority of these fish caught find their way to the fresh fish market, but in some cases they have been canned and hence may properly come under consideration here. In July many of these Bluebacks have reached the stage when they are at their best, but many of them are not in this condition until August and a few may be as late as September. The flesh of these fish is better than that of the Alaska Red salmon and is practically as good as that of the Fraser river Sockeye. Is it fair to the canners if this has to go at the same price as the Medium Red or mature Coho which brings about two-thirds of the price of the Fraser river Sockeye? It does not do so because it is not labelled "Medium Red" or "Coho." As it is labelled, the buyer and the consumer are not defrauded, as the article is worth the price but there is something wrong with the system that makes it necessary to label the product thus.

In July, August, September, as the case may be, the roe develops rapidly, the flesh deteriorates and the whole appearance of the fish changes as it becomes the mature Coho. The metallic blue disappears, the scales no longer rub off easily, but become more and more firmly set until they are almost embedded in the skin. The fish are in this condition when they approach the rivers from the open sea. They supply the material for the Medium Red salmon of commerce, which is much poorer in quality than first class Sockeye or than the canned product from the Bluebacks caught somewhat earlier in the season.

Then there is the final stage when the roe is almost fully developed, during which the fish enter the mouths of the streams up which they go to spawn. They then become darker in color, the males especially more or less blotched with red or even becoming of a uniform red, lose all their metallic lustre and the males get the characteristic hooked nose. The flesh is scarcely suitable for human food. The catching of such fish should be prohibited as they are worth more as prospective parents when they have passed thus far through all the dangers of their existence and have put so much of themselves into the chances of perpetuating the race.

In this species, therefore, there are four successive stages within a few months. If these are all to be graded as Medium Red, we might as well be "somewhere east of Suez, where the best is like the worst."

The Pink or Humpback salmon is quoted at much the same price throughout, but there may be much difference in size and quality in nearby localities. They, like the Sockeye, are caught only as spawning time more or less nearly approaches, but in these mature Humpbacks an average difference of two inches in length has been noted in the same year in two races leaving the open sea not 40 miles apart. No other species deteriorates to such an extent before reaching the mouths of the rivers as the Humpback. In many instances the quality is exceedingly poor some time before the river is reached. When deterioration in any species begins the scales begin to disintegrate at the margin. The amount of disintegration of the scale is a good indication of the amount of deterioration in the flesh. The Humpback spawns in its second year. Disintegration in the scale may take place when the fish are still many miles from the mouth of the stream, to such an extent that all of the second year's growth, nearly half of the whole scale, may be worn away. What must they be like when they have entered the rivers? Yet they are all Pink salmon.

The case of the Dog salmon is much like that of the Humpback for, like the Humpback and the Sockeye, apparently it disappears early from the inshore waters and goes out into the open ocean to feed, where it remains until nearly spawning time. There may be just as much difference in the fish that run up two comparatively nearby streams in this species and in some cases it is very noticeable. The Dog salmon has been very much maligned by some of those who have seen schools of them entering the rivers, when the male has become dark red or purple and his head has become grotesque on account of the change in the appearance of the jaws, but at his worst he is no more repulsive than the worn, frayed, fungus-spotted Sockeye on the spawning beds. The Sockeye, however, is probably hundreds of miles from the sea, far away among the wilds, seen only by a few and the Dog salmon is usually

so near the sea when it spawns and so near spawning when it leaves the sea, that its ugliness attracts attention. The Dog salmon in its prime condition is an excellent fish, but as in other species, these prime fish should not be lumped with the deteriorated specimens caught near the spawning beds, all under the name of "Chum" salmon.

Under the present system of grading, it seems to me, there is a much greater inducement for the cannery man to continue putting up the deteriorated and deteriorating article than to confine himself to putting up only the first class product, particularly in the case of the fall fish. Of course there is a reputation to sustain, but that reputation is built up largely on Sockeye and Spring salmon in any case and as a Chum is a Chum, worth 90c to $1.00 a dozen cans, the longer the season is continued the better, especially as the fish are more readily rounded up the nearer they are to the mouth of the river. There are cans still on hand and tin plate costs money, there may be contract labor to pay for. At the best it is only Chum salmon, at the worst it is still Chum salmon.

Of course the color prejudice must be kept in mind. It will require much educational work before this can be eliminated and if consumers are willing to pay a high price for color, one might suppose they should be allowed to do so. This is not an isolated instance, as color is required in other food products. Reference has already been made to the fact that first grade Coho is quite as good as Fraser river Sockeye and is of almost as good a color. Those who have eaten Pink salmon when in the best condition will agree with me that as fresh fish it has at least as good a flavor as Sockeye and many will say it has the best flavor of all the salmon and the color at that time makes a fair approach to the salmon red. This is true of the Dog salmon also and even it may have considerable color. Why then, if these are put up in fine condition, should they be sold at a price much less than half of that obtained for Sockeye, no matter what state the Sockeye is in?

It is quite true that analyses made by the U. S. Department of Agriculture of fish in the can, show a larger percentage of water and a smaller percentage of fat in the Medium Red, Pink and Chum than in the Puget sound Sockeye, but we have no assurance that these fish were in equally prime condition for the species when they were put in the can, and such a test only, would be fair to the species. If it were an average can of each, the probability would be that the fall fish would not be in the same prime condition. It would be an easy matter to get more difference than is shown in this examination, in individuals of the same species, e. g., Spring or Sockeye, taken at different times in the one season.

Taking all this into consideration, I should think it much better for everyone concerned if, instead of grading salmon by species, it were graded according to quality. At first it might be necessary to take cognizance of the color, but through a process of education that might be dispensed with later. In such a case, such fish as the Fraser river Sockeye, the Columbia river Chinook and the strait of Georgia Coho, in its prime (Blueback), all of these in good condition, should be included in the first grade; the Alaska Red, the Alaska King, the best medium Red, Pink and Chum, as well as second quality Sockeye and Spring, in the second grade; the fair quality medium Red, Pink and Chum, in the third grade and the poorer quality medium Red, Pink and Chum, in the fourth grade.

With some such grading, the first grade would always command a high price and the other grades accordingly, the fourth grade selling for but a small percentage of the first grade, and the fish so far gone as to be unfit for human food would be in so little demand that it would not pay any canner to put it up under any circumstance hence there would not be the same inducement to put up this class material as there is at present.

In the fresh fish trade, the necessity for such grading is not so marked, as the conditions of buying and selling are rather different. In the fresh fish somewhat different qualities are required. While the Sockeye makes the best canned product, the very texture that makes it so, makes it less suitable, when cooked fresh out of the water, than a good white Spring, a prime Humpback or even a first class Dog salmon. In the fresh fish trade the consumer has a chance to see for himself what he is getting and if he does not get what he pays for it is largely his own fault.

The frozen fish trade has been confined so largely to one or two species that one cannot judge of the necessity or of the benefit of grading as applied to it.

Summary.

The present method of grading of Pacific Canned Salmon is based largely on the difference in species.

The quality of the flesh varies in the same species in different areas and at different times in the same area.

The fish is in best condition at the time the milt or roe begins to develop rapidly in preparation for the spawning process. As the milt or roe develops, the stored up nourishment in the flesh and the fat is drawn upon to build up the highly complex sexual products. The flesh deteriorates until it is no longer fit for food and the fish becomes more valuable as a prospective parent than as the basis for a food product.

In prime condition, the flesh of any species of salmon is good, but as spawning time approaches the flesh of all species becomes unfit for food. The present method of grading salmon does not sufficiently recognize the changing quality in the same species and hence there is an inducement to make use of a poor quality of fish to make up the quantity.

A fairer grading would be obtained if the quality, not the species, was made the criterion in all cases, so that the best quality of Canned Salmon would always command the highest price and the unsuitable low grade material would be driven from the market.

